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Results of Seal Biology Study, Greenland Sea, 1965

A.G. Beloborodov and V.A. Potelov,
Marine Mammal Laboratory

The 1965 Greenland Sea sealing season saw severe ice conditions /60* matching those of other bad years (1959, 1963 and 1964).

The area where Soviet sealing ships sought and took seals this year [1965] was mainly the ice between 71 and 74°N east of Jan Mayen Island. The types of ice most often encountered in this region were small floes (up to 50%) and very light floes: pancake and newly formed ice with a density of as much as 8 to 9 [on a scale of 10]. The strip near the edge was made up of newly formed and pancake ice and one-year-old very light floes with a density of 2 to 3 [on a scale of 10]. As in previous years, the northeastern edge of the ice had no clear-cut boundaries and consisted of different-sized ice belts separated by wide pools of open water.

The weather also adversely affected the seal hunt. We noted frequent, prolonged fogs, sudden, heavy snowfalls and rain throughout the entire sealing period (20 March-5 May). The mean atmospheric

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*Numbers in the right-hand margin indicate the corresponding pages in the original.

temperature at the beginning of sealing was minus 9.1° (min = -19.0°, max = -2.1°), and at the end, minus 3.2° (min = -10.0°, max = +2.0°). In March the prevailing winds were from the north (50.9%) and northeast (12.2%). Winds from other directions were negligible during our observations and did not substantially affect the position of the ice edge. In the second half of April and at the beginning of May the winds changed often: west, 17.6%; northwest, 10.0%; south, 13.1%; southwest, 10.9%; and east, 10.0%, considerably affecting the distribution of the eastern and northeastern areas of ice at the edge [of the fixed ice mass] and helping form compact, narrow ice "spits" and wide patches of open water. The variation in the position of the [ice] edge appears in Fig. 1.

We found no hooded seal rookeries in the 1965 sealing season. The ships worked on sparse accumulations of families in a region bounded by the following points: 71°18'N 6°30'W; 72°40'N 3°W and 71°55'N 01°00'W. We also shot solitary males in this same region in April.

In order to determine the age composition of the hooded seals, we took the lower jaws of animals that had been taken on four expeditionary ships. We took a total of 848 samples, including 540 males and 308 females.

We can subdivide the material of this year into four groups (corresponding to the ships on which we took the seals' lower jaws) and analyze the age composition by variational [distributional] statistics methods in order to establish the accuracy of small samplings and the /61 methodological validity of possibly combining the material on the age composition of male hooded seals taken in March and April-May 1965.

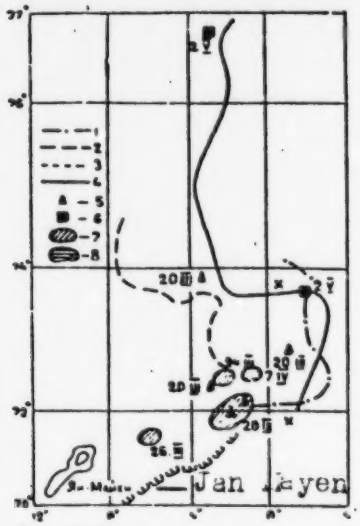

Рис. 1. Положение кромки льда и распределение тюленей в 1965 г.:
1 — кромка льда на 20.03; 2 — кромка льда на 1.04; 3 — кромка льда на 17.04; 4 — кромка льда на 5.05; 5 — детные залежки лысуна; 6 — линные залежки лысуна; 7 — скопления хохлачей; 8 — хохлуша, серка.

Fig. 1 - Ice edge position and seal distribution in 1965:

1 - ice edge on 20 March; 2 - ice edge on 1 April; 3 - ice edge on 17 April; 4 - ice edge on 5 May; 5 - harp seal breeding grounds; 6 - harp seal moulting grounds; 7 - hooded seal stocks; 8 - juvenile hooded seal[s]* and juvenile harp seal[s].

The data in Table 1 show no significant (positive) differences in the age composition of males taken in March and April-May. The value of the index of significance in the difference (t) (1) in the four groups of samples varies from +0.57 to -1.7 and indicates that these differences may be random; if the size of the sample is sufficient, the index of significance in the difference may only be less than 2 ($t < 2$). Hence these samples may be combined for calculations without risk of serious error.

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*Translator's note. "Juvenile hooded seal[s]" is a proposed rendition of the original Russian khokhlusha, for which no other more suitable English equivalent is available. A possible alternative is "silver-jar stage" (but applied to Bering Sea ringed seal).

The variation in the mean age values in the samples (Table 1) from 9.63 to 12.54 indicates that small samples cannot give a true picture of the age composition of a hooded seal herd in the period when the young are born [and raised]. From an analysis of material on the age composition of hooded seal stocks from 1961 to 1965 we consider that the minimum sample for describing them should contain not less than 200 to 250 males and the same number of females.

Table 1

The Mean Age of Hooded Seal Males Taken in March and April-May 1965

Group №№ групп No.	Taken Добытые в марте in March			Добытые в апреле — мае Taken in Apr.-May			
	n_1	$M_1 \pm m_1$	σ	n_2	$M_2 \pm m_2$	σ	$t = \frac{M_1 - m_2}{\sqrt{m_1^2 + m_2^2}}$
I	45	10,86±0,65	4,39	53	11,41±0,85	6,19	—0,46
II	53	11,98±0,73	5,14	17	11,35±1,13	4,66	+0,57
III	35	9,63±0,61	3,61	34	11,53±0,82	4,77	—1,64
IV	33	9,73±0,95	5,48	30	12,54±1,08	5,91	—1,70

The age composition of female hooded seals changed little from 1964 to 1965. A notable feature, however, was the increase in the number of young females among the animals taken.

In 1965, females born in 1959 represented the highest percentage (24%) of the kills, and they kept this dominant position in the commercial take from 1963 onwards (Fig. 2).

The increase in the number of young females in the kills drew down their average age from 9.3 to (1964) to 8.4 (1965).

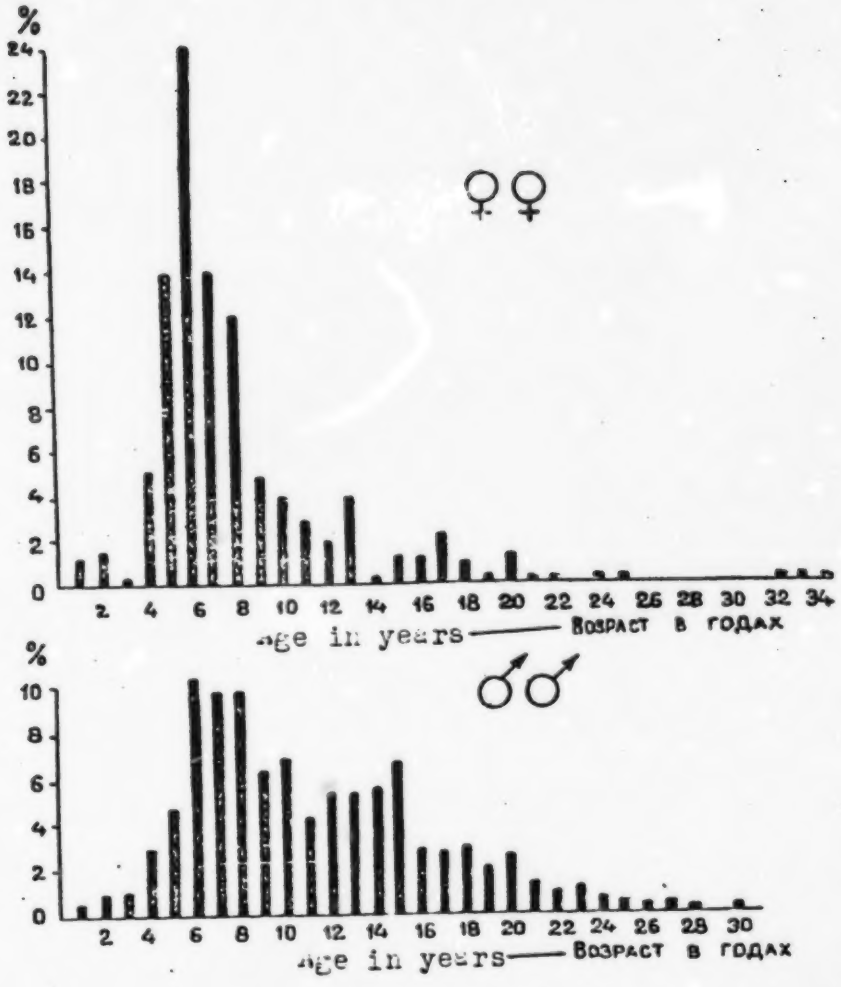

Рис. 2. Хохлач в побойках 1965 г.

Fig. 2 - Hooded seals in the 1965 kills.

We also noted that the age group of male hooded seals born in 1959 predominated in the kills.

In 1965, as in previous years, we collected and processed material on the reproduction biology of female hooded seals. We collected 79 pairs of ovaries from females shot in postpartum stocks in /63
March and, in small numbers, in April. When we compared the 1965 material with that collected previously (1961-1964), we found a difference in the times when the first ovulation began. Thus in 1964 and 1965 among females in their fifth year we found no ovaries with three traces of past pregnancies (Table 2), whereas in 1963 among this age group 14.7% of the specimens each had three traces of past pregnancies.

Table 2

Numbers of Corpora Lutea of Pregnancy and Their Traces in Ovaries of Hooded Seals, 1965

Age (years)	Pairs of ovaries examined	Number of corpora lutea and their traces, %		
		1	2	3
4	5	80	20	—
5	12	66.6	33.4	—
6	18	27.7	50.0	22.3
7	13	7.8	46.1	46.1
8	17	23.5	35.3	41.2
9	3	—	33.3	66.7

In 1964 in the ovaries of all females in their fourth year we noted only one corpus luteum of pregnancy each; in 1965, however, 20% of the females in their fourth year each had two traces of past pregnancy. We noted similar deviations when we investigated the ovaries of females in other age groups.

Material (collected from 1961 to 1965) on the reproduction biology of female hooded seals showed that the percentage of those that had reproduced for the first time (with one corpus luteum of past pregnancy in their ovaries) varied every year, probably for many reasons, mainly the numbers in the age groups reproducing for the first time. Despite the extensive material on hooded seal reproduction biology already collected on breeding grounds, we consider that these collections must nonetheless continue, since only by examining ovaries can we assess the recruitment of a herd by females reproducing for the first time. This factor is highly important in describing the state of a hooded seal herd.

An annual sample containing 100 pairs of ovaries can suffice to describe the state of the brood stock in accumulations of reproducing animals.

We found small groups of postpartum harp seals from 18 to 20 March at the following points in the Greenland Sea: 72°02'N 02°00'W; 72°30'N 02°40'W; 72°50'N 01°00'W; 73°55'N 03°40'W. We found no major breeding grounds when the ship began sealing. Only on 7 April in the region of 72°15'-72°50'N and 0°05'-1°30'W did our ships encounter a fairly large, scattered harp seal rookery comprising pups in different stages of moulting and a small number of females that had not yet finished nursing their pups.

Table 3

Harp Seal Moulting Rookery Locations and Numbers of Animals
(approximate count)

Дата Date	Координаты Coordinates	Количество голов Number of head
20/IV 1965	73°58′—4°00′ з. д.—W	500
21/IV То же	73°41′—2°45′ з. д.	200—300
22/IV » Same	73°53′—3°30′ з. д.	200
23/IV »	73°49′—2°21′ з. д.	500
23/IV »	73°50′—3°20′ з. д.	500
23/IV »	74°05′—5°15′ з. д.	1 000—1 500
24/IV »	74°15′—3°45′ з. д.	200—300
24/IV »	74°10′—3°25′ з. д.	25—30
24/IV »	74°10′—3°25′ з. д.	50
25/IV »	74°44′—5°40′ з. д.	1 000
30/IV »	76°00′—9°45′ з. д.	300
2/V »	73°25′—1°10′ з. д.	а.—Плотная залежка длиной 1.5 мили, шириной 0,5 мили
2/V »	76°25′—2°45′ з. д.	10 000
3/V »	73°30′—0°10′ в. д.—E	400

Key:

a. Compact rookery 1.5 miles long and 0.5 mile wide

We began to encounter harp seal moulting rookeries in the process of formation (Table 3) and numbering 100 to 200 head each from 21 to 30 April, and only on 2-3 May did we find three rookeries numbering from 1,000 to 10,000 head. The animals, however, had not yet settled down, and after [we fired] a few shots, they withdrew into the water.

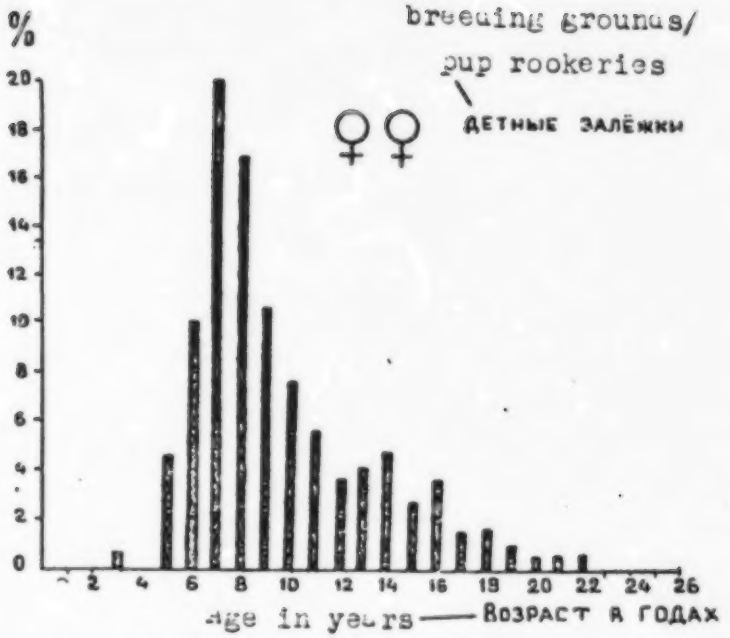

Рис. 3. Гренландский тюлень. Район Ян-Майена. 1965 г.

Fig. 3 - Harp seal. Jan Mayen region, 1965.

Table 4

The Age Composition of Female Harp Seals at the Beginning and End of the Reproductive Period (at different rookeries)

Таблица 4

Возрастной состав самок гренландского тюленя в начале и конце детного периода (на разных залежках)

Time sample taken / Время взятия пробы	n	M ∓ m	σ	$t = \frac{M_1 - M_2}{\sqrt{m_1^2 + m_2^2}}$
at beginning / В начале	68	9,51∓0,44	3,68	0,09
В конце / at end	129	9,46∓0,32	3,69	

We collected material on harp seal age composition when the pup rookeries began to form (20-23 March), at the time when they broke up (4-10 April) and at moulting rookeries. We took the lower jaws, and determined the age, of a total of 334 seals, including 232 females and 102 males (Figs. 3 and 4).

There were no significant differences of any kind in the age composition of the females harvested at the beginning or the end of the whelping period (Table 4). This enabled us to combine the material of both periods and to establish the changes that had occurred in the age composition of female harp seals at pup rookeries as a result of a forced two-year suspension of commercial harvesting. (The ships found no pup rookeries in 1963 or 1964).

As we can see from Table 5, the mean age of female harp seals at pup/whelping rookeries dropped from 11.4 (1962) to 9.63 (1965). These changes resulted mainly from an increase in the number of females /65
in their 7th and 8th years, and a decrease in that of females in their 10th to their 15th years, at pup/whelping rookeries.

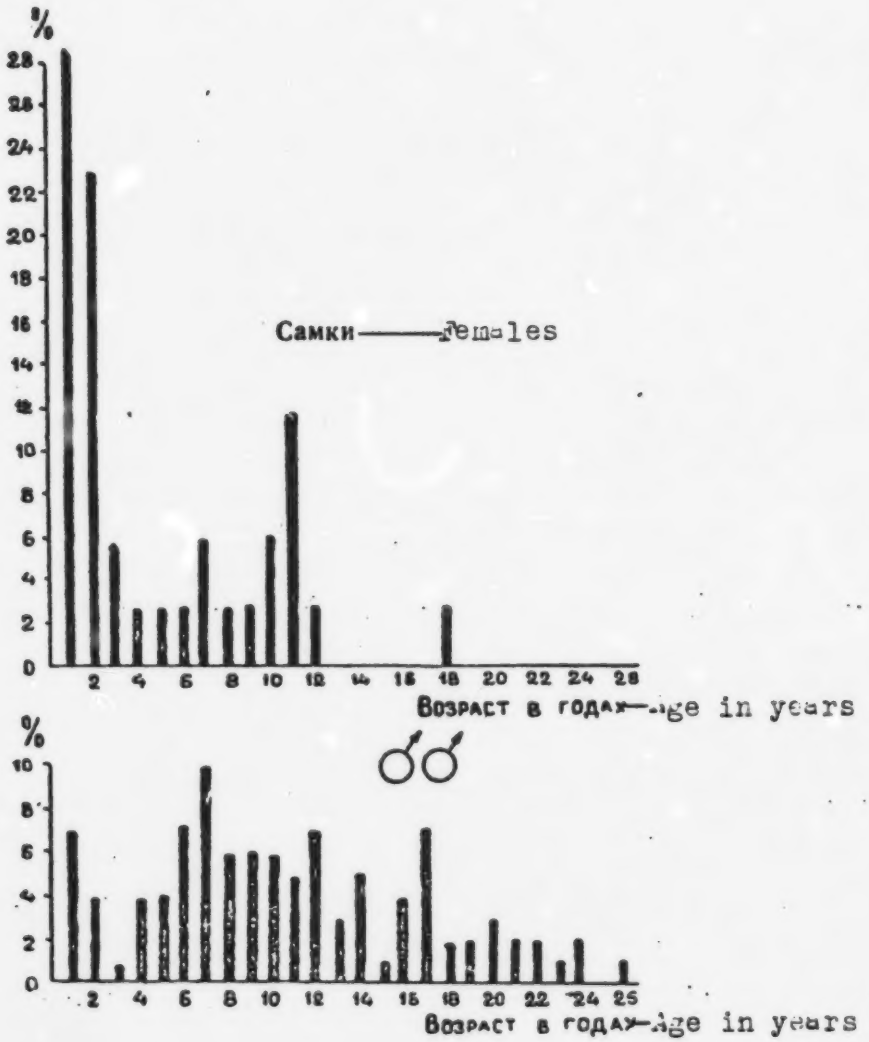

Рис. 4. Гренландский тюлень в побойках на линных залежках в районе Ян-Майена, 1965 г.

Fig. 4 – Harp seal in kills at moulting rookeries in the Jan Mayen region, 1965.

Table 5

Mean Age of Female Harp Seals Harvested at Pup/Whelping Rookeries in 1962 and 1965

Таблица 5

Средний возраст самок гренландского тюленя, добытых на детных залежках в 1962 и 1965 годах

Год Year	n	M ± m	σ	$t = \frac{M_1 - M_2}{\sqrt{m_1^2 + m_2^2}}$
1962	317	11.4 +0.24	4.32	4.9
1965	197	9.63±0.27	3.77	

Results of analysis of the sex composition of seals in kills /66 showed that at the beginning of the moulting period males, comprising 74.3%, dominated in rookeries in the process of formation (Table 6).

In order to study reproduction biology we dissected 114 females aged from 5 to 21 years at harp seal pup/whelping rookeries. From our examination of the ovaries of these females we were able to conclude the following: by the age of nine years most females had already begun to reproduce (Table 7). Females that had reproduced for the first time (with 1 corpus luteum of pregnancy) made up 27.2% of all the females that we investigated. Our discovery of three females in their fifth year with two, and two females in their sixth year with three, traces of previous pregnancies, confirmed R.Sh. Khuzin's (2) communication to the effect that female harp seals of the Jan Mayen herd can be impregnated [at the age of] three years.

Table 6

The Sex and Age Composition of the Harp Seal at the Beginning of the Moulting Period, 1965

Таблица 6

Половозрастной состав гренландского тюленя в начале линного периода, 1965 г.

Возрастная группа Age group	Пол Sex	Количество Quantity	% %
1—3 года—years	самцы—males	12	8.8
	самки—females	20	14.6
4—6 лет—years	самцы—males	15	10.9
	самки—females	3	2.2
7 лет и старше years & older	самцы—males	75	54.7
	самки—females	12	8.8
Итого... Total	—	137	100%
в том числе including	самцов—males	102	74.3%
	самок—females	35	25.7%

Table 7

Numbers of Corpora Lutea of Pregnancy and Their Traces in the Ovaries of Female Harp Seals, Pup/Whelping Rookeries, 1965

Таблица 7

Количество желтых тел беременности и их следов в яичниках самок гренландских тюленей, детные залежки, 1965 г.

Возраст (годы) Age (years)	Просмотрено пар яичников Pairs of ovaries examined	Количество желтых тел и их следов, % Number of corpora lutea and their traces, percent		
		1	2	3
5	6	50.0	50.0	—
6	14	50.0	35.7	14.3
7	20	35.0	45.0	20.0
8	18	27.8	33.3	38.9
9	12	16.7	50.0	33.3
10	8	—	50.0	50.0

The reason for the discovery of only one corpus luteum of pregnancy each in the ovaries of some females in their 11th to 16th years, remains uncertain.

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